

### TRAINING LESSON 4 - Part 2

<b>Title</b>	◆ Sustainable forest management
<b>Part of the training course referred to in this lesson</b>	◆ Part 1 <input type="checkbox"/> General information about sustainability and CE Part 2 Specific Information about:  X Wood sector <input type="checkbox"/> Plastic sector <input type="checkbox"/> Agrifood sector
<b>EQF level</b>	Level 3
<b>Where the lesson was tested</b>	//
<b>General Learning objective(s) according to the Bloom Taxonomy</b> <a href="https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/">https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/</a>	<input type="checkbox"/> <b>Create</b> Produce new or original work (design, assemble, construct, investigate, formulate) <input type="checkbox"/> <b>Evaluate</b> Justify a stand or decision (appraise, argue, defend, critique, select, support) <input type="checkbox"/> <b>Analyze</b> Draw connections among ideas (differentiate, organize, relate, compare, distinguish, test, experiment) X <b>Apply</b> Use information in new situations (execute, implement, solve, use, demonstrate, operate) X <b>Understand</b> Explain ideas or concepts (classify, discuss, describe, identify, locate, translate) X <b>Remember</b> Recall facts and basic concepts (define, duplicate, list, memorize, repeat)
<b>Specific learning objective(s)</b>	<ul style="list-style-type: none"> <li>● <i>To understand the forest ecosystem and multifunctional role of the forest</i></li> <li>● <i>To understand the sustainable forest management process, actions</i></li> <li>● <i>Apply knowledge to research forest situations in your country</i></li> </ul>
<b>Cognitive, socioemotional and behavioural outcomes</b>	<b>SDG 15 Life on Land:</b> Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

<p><b>based on</b> <a href="https://www.unesco.de/sites/default/files/2018-08/unesco_education_for_sustainable_development_goals.pdf">https://www.unesco.de/sites/default/files/2018-08/unesco_education_for_sustainable_development_goals.pdf</a></p>	<p><b><i>Cognitive learning objectives</i></b></p> <p>The learner understands the manifold threats posed to biodiversity, including habitat loss, deforestation, fragmentation, overexploitation and invasive species, and can relate these threats to their local biodiversity.</p> <p><b><i>Socio-emotional learning objectives</i></b></p> <p>The learner is able to argue against destructive environmental practices that cause biodiversity loss.</p> <p>The learner is able to argue for the conservation of biodiversity on multiple grounds including ecosystems services and intrinsic value.</p>																
<p><b>Green skill(s) addressed</b></p>	<table border="0"> <tr> <td><input type="checkbox"/> Creative problem-solving</td> <td><input checked="" type="checkbox"/> Management skills</td> </tr> <tr> <td><input checked="" type="checkbox"/> Forward-thinking</td> <td><input checked="" type="checkbox"/> Impact quantification</td> </tr> <tr> <td><input type="checkbox"/> Monitoring skills</td> <td><input checked="" type="checkbox"/> Life-cycle management</td> </tr> <tr> <td><input type="checkbox"/> Analytical skills</td> <td><input checked="" type="checkbox"/> Science skills</td> </tr> <tr> <td><input type="checkbox"/> Lean production</td> <td><input checked="" type="checkbox"/> Waste management</td> </tr> <tr> <td><input type="checkbox"/> Maintenance and repair skills</td> <td><input type="checkbox"/> Environmental auditing</td> </tr> <tr> <td><input checked="" type="checkbox"/> Pollution prevention</td> <td><input checked="" type="checkbox"/> Ecosystem management</td> </tr> <tr> <td><input type="checkbox"/> Eco-design</td> <td><input type="checkbox"/> Other _____</td> </tr> </table>	<input type="checkbox"/> Creative problem-solving	<input checked="" type="checkbox"/> Management skills	<input checked="" type="checkbox"/> Forward-thinking	<input checked="" type="checkbox"/> Impact quantification	<input type="checkbox"/> Monitoring skills	<input checked="" type="checkbox"/> Life-cycle management	<input type="checkbox"/> Analytical skills	<input checked="" type="checkbox"/> Science skills	<input type="checkbox"/> Lean production	<input checked="" type="checkbox"/> Waste management	<input type="checkbox"/> Maintenance and repair skills	<input type="checkbox"/> Environmental auditing	<input checked="" type="checkbox"/> Pollution prevention	<input checked="" type="checkbox"/> Ecosystem management	<input type="checkbox"/> Eco-design	<input type="checkbox"/> Other _____
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<p><b>Duration</b></p>	<p>20 minutes</p>																
<p><b>Structure and content of the lesson</b></p>	<p><b>INTRO:</b></p> <p>Through various recommendations and strategic objectives, the EU aims to promote sustainable forest management and sustainable forest restoration and planting, as well as to strengthen the multifunctionality of forests and the role of forests as carbon dioxide absorbers (carbon sink), to ensure the good condition of habitats and species by protecting forests and restoring forest ecosystems, to strengthen the resilience of forests to climate change and socio-economic development of rural areas.</p> <p>Public and private forest owners and managers need drivers and financial incentives to be able to provide, in addition to wood and non-wood materials and products, also ecosystem services through forest protection and restoration and to increase the resilience of their forests through the</p>																

adoption of most climate and biodiversity friendly forest management practices.

[https://eur-lex.europa.eu/resource.html?uri=cellar:0d918e07-e610-11eb-a1a5-01aa75ed71a1.0001.02/DOC\\_1&format=PDF](https://eur-lex.europa.eu/resource.html?uri=cellar:0d918e07-e610-11eb-a1a5-01aa75ed71a1.0001.02/DOC_1&format=PDF)

The EU's forest sector is essential for achieving the goal of carbon neutrality in 2050, as it contributes to the mitigation of climate change in three main ways: sequestration, storage, substitution: carbon sequestration, carbon storage in trees and wood products.

The practice of forest management is enshrined in national and regional legal acts according to the principles of distribution of competence and subsidiarity, which meet the criteria and indicators of "Forest Europe".

[https://www.foresteuropa.org/wp-content/uploads/2017/03/CI\\_4pages.pdf](https://www.foresteuropa.org/wp-content/uploads/2017/03/CI_4pages.pdf)

The Commission encourages forestry stakeholders to join the Pact for Skills: for up- and reskilling people in the forestry sector in various forms - large-scale partnerships, regional/local partnerships, tripartite agreements or commitments of single entities. Forest and forestry stakeholders would work together under the Pact in order to adapt education and training for foresters to the challenges and needs of today's realities.

<https://ec.europa.eu/social/main.jsp?catId=1517&langId=en>

SDG 15 Goal - Life on Land - Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

<https://www.globalgoals.org/goals/15-life-on-land/>

The EU Biodiversity Strategy for 2030 sets out a pledge to plant at least 3 billion additional trees by 2030 in full respect of ecological principles. This Strategy includes a roadmap for the implementation of the pledge based on the overall principle of planting and growing the right tree in the right place and for the right purpose.

[https://eur-lex.europa.eu/resource.html?uri=cellar:0d918e07-e610-11eb-a1a5-01aa75ed71a1.0001.02/DOC\\_1&format=PDF](https://eur-lex.europa.eu/resource.html?uri=cellar:0d918e07-e610-11eb-a1a5-01aa75ed71a1.0001.02/DOC_1&format=PDF)

→ EU BIODIVERSITY STRATEGY FOR 2030

<https://www.eea.europa.eu/policy-documents/eu-biodiversity-strategy-for-2030-1>

Primary and old-growth forests cover about 3% forested land in the EU. They are among the richest forest ecosystems in the EU, storing large carbon stocks and absorbing carbon dioxide from the atmosphere, and are crucial for biodiversity and the vital ecosystem services they provide.

The extraction of forest biomass resources is prohibited in primary forests and restricted in high biodiversity forests to ensure that it does not interfere with the achievement of nature conservation objectives.

European primary forest database v2.0

<https://www.nature.com/articles/s41597-021-00988-7>

### Definitions

*“Sustainable forest management - the stewardship and use of forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national and global levels, and that does not cause damage to other ecosystems.”*

According to Helsinki resolution

[https://eur-lex.europa.eu/resource.html?uri=cellar:0d918e07-e610-11eb-a1a5-01aa75ed71a1.0001.02/DOC\\_1&format=PDF](https://eur-lex.europa.eu/resource.html?uri=cellar:0d918e07-e610-11eb-a1a5-01aa75ed71a1.0001.02/DOC_1&format=PDF)

*“A forest ecosystem can be defined at a range of scales. It is a dynamic complex of plant, animal and micro-organism communities and their abiotic environment interacting as a functional unit, where trees are a key component of the system. Humans, with their cultural, economic and environmental needs are an integral part of many forest ecosystems.”*

<https://www.cbd.int/forest/definitions.shtml>

Primary forest - *“Naturally regenerated forest of native tree species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.* Some key characteristics of primary forests are 1) They show natural forest dynamics, such as natural tree species composition, occurrence of dead wood, natural age structure and natural

regeneration processes; 2) The area is large enough to maintain its natural ecological processes; and 3) There has been no known significant human intervention or the last significant human intervention was long enough ago to have allowed the natural species composition and processes to have become re-established.”

<https://op.europa.eu/en/publication-detail/-/publication/20ff0b31-a3dc-11eb-9585-01aa75ed71a1/language-en>

**Deforestation** - *“the clearing or thinning of forests by humans. Deforestation represents one of the largest issues in global land use. Estimates of deforestation traditionally are based on the area of forest cleared for human use, including removal of the trees for wood products and for croplands and grazing lands. In the practice of clear-cutting, all the trees are removed from the land, which completely destroys the forest”.*

<https://www.britannica.com/science/deforestation>

**Afforestation** *is the establishment of a forest or stand of trees (forestation) in an area where there was no previous tree cover. Many government and non-governmental organizations directly engage in afforestation programs to create forests and increase carbon capture. Afforestation is an increasingly sought-after method to fight climate concerns, as it is known to increase the soil quality and organic carbon levels into the soil, avoiding desertification.”*

<https://en.wikipedia.org/wiki/Afforestation>

**Reforestation** *(occasionally, reforestation) is the natural or intentional restocking of existing forests and woodlands (forestation) that have been depleted, usually through deforestation, but also after clearcutting.*

<https://en.wikipedia.org/wiki/Reforestation>

### **TOPIC 1: Multi-functional role of forests, forest ecosystem services**

Forest ecosystem can be classified into 3 major types, based on the climatic conditions of that particular region.

- tropical forest ecosystem
- temperate forest ecosystem
- boreal ecosystem

Forest Ecosystem Definition – Types of Forest Ecosystem and Characteristics

<https://www.earthreminder.com/forest-ecosystem-types-characteristics/>

Forests play irreplaceable role for:

- Reducing the risk of floods, fires, landslides
- Carbon accumulation and absorption function (Quantifying the substantial roles of forests in absorbing, storing, and releasing carbon is key to understanding the global carbon cycle and hence climate change).
- Fresh air production (oxygen production))
- Water cycle regulation
- Habitat function of various species living in forests: trees, plants, animals, mushrooms, microorganisms (biodiversity)
- Prevent soil erosion by fixing the soil with forest floor and vigorous tree root systems.
- Feeds the groundwater supply.
- The forest can also protect homes and villages from strong winds.

#### Socio-economic functions of forests

- Providing jobs and growth opportunities in rural areas and recreational functions contributing to citizens' physical and mental health
- Ecological tourism
- Recreation and relaxation.
- Forest holdings
- Contribution of forest sector to GDP
- Net revenue
- Investments in forests and forestry
- Wood consumption
- Trade in wood
- Wood energy

#### **Topic 2: Sustainable forest management**

Forest management practices that preserve and restore biodiversity lead to more resilient forests that can deliver on their socio-economic and environmental functions.

Forestry takes 40 to 60 years to complete a harvest and replanting.

Planning is essential for sustainable forest management.

Criteria related to forest ecosystem health, biodiversity and climate change, will need to be improved in order to be used as a tool for more detailed

analysis, allowing to identify and compare different forest management methods, their effects and the overall state of EU forests.

The supply of wood products should be done in synergy with improving the conservation status of European and global forests, and preserving and restoring biodiversity for forest resilience, climate adaptation and forest multifunctionality.

The amount of wood used for various needs (energy, wood production) must not exceed the established limits of sustainability and must be used following order of priorities: 1) wood-based products, 2) extending their service life, 3) re-use, 4) recycling, 5) bio-energy and 6) disposal.

One of the goals of cascading is to reduce the amount of quality roundwood used for energy production.

- adaptive restoration and ecosystem-based management practices of forests
- Resilience-enhancing forest management practices to overcome climate change
- Forest ecosystem-based forest management methods
- Closer-to-nature forestry

Sustainable forest management methods and tools must ensure:

- Forest productivity
- Increase the volume of wood production
- Increase biodiversity
- Increase the absorbed amount of carbon dioxide
- Increase forest resistance to climate change
- Strengthen the healthy properties of the soil
- create more natural structures and life cycles so that each stand contains many species and trees of different ages.

#### **Actions for sustainable forest management**

- Instead of monoculture plantations, at the level of stands and landscapes, create or maintain genetically and functionally different multispecies forests, plant mixed species trees or groups of trees;
- Allow the forest to regenerate naturally or plant different types of trees in small areas, maintain a permanent forest cover of different ages;
- Wherever possible, practical measures should be taken
- to improve or maintain biological diversity;

- Pruning saves from logging the whole trees for wood and stops pathogens' spreading;

### **TOPIC 3: Unsustainable actions in forest management**

- Clear-cutting
- Removal of stumps and roots
- Wood is prepared during the migration period of birds
- The use of inappropriate techniques that cause negative effects on the environment, such as soil compaction, is not acceptable.
- Fragmentation of large forest stands into many smaller forest areas between agricultural land or urban areas clearly affects forests and forest-dependent species.

What damage causes clear cutting?

Clearcutting is an extreme logging method in which resilient natural forests are harvested and replaced with man-made tree plantations that do not replicate the ecosystem services of a healthy forest. Than cleared soil is used to plant conifer seedlings grow into an even-aged plantation, instead of a biodiverse forest with trees of many species and ages.

- Increases Wildfire Danger
- Accelerates Climate Change
- Degrades Our Waters
- Threatens Wildlife
- Magnifies Environmental Injustice
- Undermines Community Vitality for Future Generations

### **CONCLUSION**

Forests are vital for human and planet survival, as they play a multifunctional role, like carbon dioxide absorption, oxygen production, biodiversity preservation, wood provision, water cycle regulation, soil protection and many others. In order to protect forests and to maintain the areas of the forest people have to adopt sustainable forest management practices, first of all gaining knowledge and raising awareness of forest



	<p>ecosystems importance.</p>
<p><b>References</b></p>	<ol style="list-style-type: none"> <li>1. European Commission, New EU Forest Strategy for 2030, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS, 2021. <a href="https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021DC0572&amp;from=EN">https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021DC0572&amp;from=EN</a></li> <li>2. Barredo, José &amp; Brailescu, Cristina &amp; Teller, Anne &amp; Sabatini, Francesco &amp; Mauri, Achille &amp; Janouskova, Klara. (2021). Mapping and assessment of primary and old-growth forests in Europe. 10.2760/797591.</li> <li>3. LIETUVOS MIŠKO SAVININKŲ ASOCIACIJA. <i>NAUJOS ES MIŠKŲ STRATEGIJOS PROJEKTAS: LAIKAS IŠ TIKRŲJŲ ATSIŽVELGTI Į ES MIŠKŲ SEKTORIAUS NUOMONĘ</i>. 2021 06 23. <a href="https://www.forest.lt/naujienos/a-6815/">https://www.forest.lt/naujienos/a-6815/</a></li> <li>4. FOREST ECOSYSTEM DEFINITION – TYPES OF FOREST ECOSYSTEM AND CHARACTERISTICS <a href="https://www.earthreminder.com/forest-ecosystem-types-characteristics/">https://www.earthreminder.com/forest-ecosystem-types-characteristics/</a></li> <li>5. Luca Cesaro, Paola Gatto and Davide Pettenella (editors). 2008. The La Notte, Alessandra. (2008). The Multifunctional Role of Forests Policies, Methods and Case Studies. Proceedings 55. European Forest Institute.</li> <li>6. <a href="https://www.researchgate.net/publication/257988670_The_Multifunctional_Role_of_Forests_Policies_Methods_and_Case_Studies">https://www.researchgate.net/publication/257988670_The_Multifunctional_Role_of_Forests_Policies_Methods_and_Case_Studies</a></li> <li>7. ROLES OF FORESTS. <i>ECOLOGICAL SOCIETY OF AMERICA</i>.</li> </ol>

	<p><a href="https://www.esa.org/seeds/toolkits/forests/roles-of-forests/">https://www.esa.org/seeds/toolkits/forests/roles-of-forests/</a></p> <p>8. Annemarie Bastrup-Birk (2016). Sustainable management is the key to healthy forests in Europe. <a href="https://www.eea.europa.eu/lt/articles/tvari-miskotvarka-2013-europos-misku">https://www.eea.europa.eu/lt/articles/tvari-miskotvarka-2013-europos-misku</a></p> <p>9. RESOLUTION L2 Pan-European Criteria, Indicators and Operational Level Guidelines for Sustainable Forest Management. Third Ministerial Conference on the Protection of Forests in Europe 2-4 June 1998, Lisbon/Portugal. <a href="https://foresteurope.org/wp-content/uploads/2016/10/MC_lisbon_resolutionL2_with_annexes.pdf#page=18">https://foresteurope.org/wp-content/uploads/2016/10/MC_lisbon_resolutionL2_with_annexes.pdf#page=18</a></p> <p>10. Sustainable Forestry Management &amp; Entailed Practices. Eos data analytics. 2021. <a href="https://eos.com/blog/sustainable-forestry/">https://eos.com/blog/sustainable-forestry/</a></p> <p>11. Sustainable forestry. Washington's Working Forests. <a href="https://www.forestsandfish.com/sustainable/">https://www.forestsandfish.com/sustainable/</a></p> <p>12. Miškininkystės pagrindai. Programos „leader“ Ir Žemdirbių Mokymo Metodikos Centras. Kaunas, 2018. <a href="https://www.litfood.lt/media/file/zemdirbiu%20mokymas/pradedantiesiems%20ukininkauti/7_miskininkyste.pdf">https://www.litfood.lt/media/file/zemdirbiu%20mokymas/pradedantiesiems%20ukininkauti/7_miskininkyste.pdf</a></p>
<p><b>Interactive questions for R3</b></p>	<p>Single choice</p> <p>1. <b>How many years takes for forest to replant after harvesting?</b> <b>40-60</b> 5-10 20-30</p> <p>Multiple choice</p> <p>2. <b>Sustainable forest management actions:</b></p> <p><b>Planting different types of trees</b> Developing monoculture forest plantations <b>Preserving a sufficient amount of dead wood</b></p>

	<p>Clear-cutting</p> <p><b>Satellite monitoring</b></p> <p><b>Integrating natural fire management systems</b></p> <p>Using pesticides and herbicides</p> <p><b>Regulating the density of wild animals</b></p> <p><b>Regular inspection</b></p> <p>Removal of stumps and roots</p> <p><b>Determining areas of protected habitats</b></p>
<p><b>Keywords</b></p>	<p>Forest ecosystem, multifunctionality of forests, biodiversity, primary forest, conservation, deforestation, afforestation, reforestation, carbon sink, habitats, resilient forest</p>
<p><b>Questions for reflection</b></p>	<ol style="list-style-type: none"> <li>1. List primary and old-growth forests in your country. What actions of these forest management are foreseen in legal regulation documents?</li> <li>2. Indicate purpose or form of ownership of forests according to the laws of your country.</li> <li>3. What is the annual forest growth in your country?</li> <li>4. What forest would you recommend for recreational purposes in your country?</li> <li>5. What can be the benefit of the forest to human health?</li> </ol>
<p><b>Additional resources</b></p>	<p><b>Useful links</b></p> <p><b>INTEGRATE network</b> is an alliance of representatives of different European countries that promotes the integration of nature conservation into sustainable forest management at the policy, practice and research level <a href="https://integratenetwork.org/">https://integratenetwork.org/</a></p> <p>Under the European Green Deal, the EU Biodiversity Strategy for 2030 commits to planting at least 3 billion additional trees in the EU by 2030.</p> <p><b>MapMyTree website</b> gives citizens give the possibillity be involved in monitoring the trees planted <a href="https://mapmytree.eea.europa.eu/">https://mapmytree.eea.europa.eu/</a></p> <p>Indicators for sustainable forest management</p>

	<p><a href="https://www.foresteurope.org/wp-content/uploads/2017/03/CI_4pages.pdf">https://www.foresteurope.org/wp-content/uploads/2017/03/CI_4pages.pdf</a></p> <p><a href="https://foresteurope.org/wp-content/uploads/2016/10/MC_lisbon_resolutionL2_with_annexes.pdf#page=18">https://foresteurope.org/wp-content/uploads/2016/10/MC_lisbon_resolutionL2_with_annexes.pdf#page=18</a></p> <p>Forest genetic resources  <a href="https://www.fao.org/forest-genetic-resources/en/">https://www.fao.org/forest-genetic-resources/en/</a></p>
<p><b>Icons &amp; related info for the hints of the PowerPoint presentation</b></p>	<p><i>Please, insert here the icons and the related information that should pop-ups within the PPT as hints.</i></p>
<p><b>Author(s)</b></p>	<p>Edita Rudminaitė, VšĮ “eMundus”</p>